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is justifiable to speak of a localized phototropic irritability as merely a localization of sensitiveness to light. For this purpose he chose seedlings of *Panicum miliaceum*, in which the tip of the cotyledon alone is phototropically sensitive, and determined how the growth in length of the part not thus sensitive was affected by direct illumination and by illumination of the cotyledon tip, preliminary investigations having shown that the growth, which is restricted almost entirely to the uppermost part of the hypocotyl, is greatly retarded, and that the amount of retardation is closely dependent upon the intensity of the light. In light of moderate intensity the growth of the hypocotyl is checked almost equally, whether the cotyledon alone or the hypocotyl alone is illuminated; but only half so much as when the whole seedling is illuminated. At higher intensities, on the contrary, the illumination of the cotyledon retards the growth more; from which it is evident that the effect of the light is transmitted downward to the hypocotyl. But if one illuminates all but the uppermost 2-4^{mm} of the hypocotyl, the growth of the parts above is not retarded, and the light effect is clearly not transmitted upward. The retarding effect of illumination of the cotyledon does not proceed from its tip, which is phototropically very sensitive, for illumination of this tip alone produces far less retardation of the growth of the hypocotyl than does the illumination of a greater part of the hypocotyl. Clearly the light acts as a stimulus and both cotyledon and hypocotyl are sensitive to it. Although, as ROTHERT has shown, the hypocotyl is in general not phototropically sensitive, FITTING found that 17-25 per cent. of the seedlings whose cotyledons were darkened curved phototropically after one-sided illumination. These facts show that the distribution of *phototropic* sensitiveness does not indicate which part of the seedling perceives light. Similar results were obtained with *Sorghum Dora*, *S. vulgare*, *Zea Mays*, and *Tinantia jugax* (Commelinaceae).

FITTING found nothing to indicate that phototropic sensitiveness proceeds from any other process of light perception than that which expresses itself in retardation of growth. He suggests "that the localization of phototropic sensitiveness may perhaps be referable to the fact that the polar condition characteristic of induction of phototropism can be produced only in the phototropically sensitive zone."

He discusses also the problem of etiolation, but adds nothing new, merely emphasizing the existing view that the normal form of leaves in dicotyls depends upon the direct action of light as a stimulus without the correlations which are usually considered.—C. R. B.

Javanese Anthocerotales.—As one of the results of his recent visit to the oriental tropics, CAMPBELL¹³ has published an account of certain Javanese Anthocerotales. Among a number of species of *Anthoceros* collected at the base of Mt. Salak and also near Tjibodas, he found two forms which he believes should constitute a new genus, *Megaceros*, into which he would throw all the non-

¹³ CAMPBELL, D. H., Studies on some Javanese Anthocerotaceae. *Annals of Botany* 21:467-486. pls. 44-46. 1907; 22:91-102. pls. 9,10. 1908.

stomatiferous species with spiral elaters. The important differences between Megaceros and Anthoceros are that the former has multiple chromatophores, no stomata, a solitary antheridium, spiral elaters, and green spores. In one species (*M. salakensis*) the sporogonium dehiscens along one side. The thallus closely resembles that of Anthoceros. The reviewer has frequently observed single antheridia in *A. laevis* and the same is reported for *A. Pearsoni*. The axial row is cut out of the archegonium initial by three intersecting walls, as is true for all Hepaticae. The neck-canal cells are four, rarely five. The early development of the embryo and details of the sporogonium closely resemble Dendroceros, but the sporogenous tissue is more extensive than in either Anthoceros or Dendroceros. One figure suggests that perhaps a portion of the tip of the endothecium is sporogenous, as has been found in *Notothylas* by LANG. The sterile cells form an irregular network inclosing the spore mother cells, which are slightly lobed. The elaters are branched. No germ tube is produced.

Two Javanese species of Dendroceros, designated *A* and *B*, were studied. Species *A* had a better-developed columella than *B*. In a Jamaican species the reviewer finds that the tip of the sporogonium is occasionally sterile. Spores of *A* and *B*, as well as other Javanese species of Dendroceros, germinate before being shed.

Notothylas javanicus closely resembles the cosmopolitan *N. orbicularis*. The archegonia are broader than in Anthoceros, but the neck-canal cells are reduced to three. The first division of the embryo is longitudinal, and not transverse as MOTTIER thinks is true in *N. orbicularis*. It is suggested that possibly the endothecium contributes something toward sporogenous tissue, as has been recently shown in another species of *Notothylas* by LANG, although CAMPBELL makes no mention of LANG's work.

CAMPBELL thinks that perhaps the affinities of the Anthocerotales are with the Marchantiales rather than with the Jungermanniales; that perhaps the sporogonium of *Notothylas* is best compared with that of *Cyathodium*. He thinks that the relationships of the group are so remote from other Hepaticae that it should form a special class, "Anthocerotes."—W. J. G. LAND.

Ever-sporting varieties and variegation.—Ever-sporting varieties have received illuminating treatment by BAUR,¹⁴ who places the sport condition among the normal fluctuating reactions of the particular variety in question. When there is a complete parallelism between the modification of a character and the variation of external stimuli which cause the modification, a chance distribution of varieties results; but when this parallelism is only partial, as is frequently the case, a "half-Galton" or otherwise modified curve will appear, and the occurrence of such modified curves may serve as a sign of ever-sporting varieties.

The sport condition appears only when a certain intensity of the combi-

¹⁴ BAUR, E., Untersuchungen über die Erbliehkeitsverhältnisse einer nur in Bastardform lebensfähigen Sippe von *Antirrhinum majus*. Ber. Deutsch. Bot. Gesells. 25:442-454. 1907.